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HISTORICAL NOTES ON LOUISIANA PRAIRIES: CHANGES IN PRAIRIE FLORA IN HALF A CENTURY

B.R. MacRoberts & M.H. MacRoberts

Bog Research, 740 Columbia, Shreveport, Louisiana 71104 U.S.A.

&

Herbarium, Museum of Life Sciences, Louisiana State University in Shreveport, Shreveport, Louisiana 71115 U.S.A.

ABSTRACT

Unpublished field notes and herbarium specimens of C.A. Brown were used to reconstruct the 1939 floristics of the Keiffer prairies in central Louisiana. These historical data were compared with current species composition from the same prairies. Although the prairies are smaller today, we found that they have not lost species reported six decades ago. A comparison of the species composition of the Keiffer prairies with midwestern tallgrass prairies indicates that they are relatively high quality and have a rich array of conservative prairie species.

KEY WORDS: Prairie, Louisiana, floristics, Kisatchie National Forest, Keiffer Prairies

INTRODUCTION

Information on plant communities spanning decades is not easily obtained. This is particularly the case with prairies (Collins & Adams 1983). Their rapid demise has been documented and, since so little is left today, any virgin remnant is highly prized (Kucera 1992; Whitney 1994). This is especially true in the Southeast because the small isolated prairies, which were never common, were quickly destroyed or degraded by early settlers (DeSelm & Murdock 1993).

In the late 1930's, Clair A. Brown (1903-1982), Professor of Botany at Louisiana State University, took a special interest in Louisiana prairies and made numerous trips to study them (Brown 1941a, 1941b, 1953). Among the many prairies Brown visited were the Keiffer Prairies on the Winn Ranger District of the Kisatchie National Forest

in central Louisiana. These are a group of about 45 natural openings surrounded by shortleaf pine/oak/hickory forest (Smith, *et al.* 1989; Martin & Smith 1991). Land survey plats from the 1830's and 1940 aerial photographs show that these openings were larger than they are today.

After Brown's pioneering work, interest in prairies waned and the Keiffer Prairies were virtually forgotten until their rediscovery and subsequent surveys over a half century later (Smith, *et al.* 1989; Allen 1993; MacRoberts & MacRoberts 1996a, 1996b). During the last decade, studies have been undertaken on both the remnant coastal prairies and on the isolated prairies scattered through north and central Louisiana (Smith, *et al.* 1989; Smeins, *et al.* 1992; Allen 1993; Allen & Vidrine 1989; MacRoberts & MacRoberts 1995a, 1995b, 1996a, 1996b).

Brown left almost no formal record of his prairie work, publishing only three abstracts (Brown 1941a, 1941b, 1953). He did, however, leave a substantial informal record in his field notes and collections, which we believe provide a good indication of historical composition.

Using Brown's field notes and herbarium specimens, and current floristic data that were compiled independently over half a century later (Smith, *et al.* 1989; Allen 1993; MacRoberts & MacRoberts 1996a, 1996b), we hope to determine what, if any, floristic changes have occurred in five decades.

METHODS

We extracted all floristic information for the Keiffer Prairies from Brown's field notebooks and a summary of these note books labeled "Prairie Records" (Brown n.d.) stored at the LSU herbarium. On April 8, June 20, Sept. 9, 11, and 30, 1939, Brown visited the Keiffer Prairies, and collected and listed plants from several of them. He also made a visit to the "Keiffer Prairie Area" on October 25, 1941, but only collected eight species, all from the surrounding woodlands. This visit was probably short since he also visited other areas that day. He did not consider it a prairie visit since it is not listed in the "Prairie Records." Brown apparently discontinued his visits to the Keiffer Prairies at this point.

While Brown gives the location of one prairie (Sec. 26, T11N R5W), he simply designated others by such descriptions as "Twin Prairie" (now called Carpenter Road Prairie: Sec. 13, T11N R5W) and "Small black prairie [on] sand dump road." All these openings appear to have been within a short distance of each other and are part of what was then and still is a group of closely associated prairie remnants.

Using current lists of the Keiffer flora (Smith, *et al.* 1989; Allen 1993; MacRoberts & MacRoberts 1996b) and Brown's lists, we searched the LSU herbarium for his specimens. There were, of course, the normal problems: specimens on loan, misplaced, lost, never entered, or destroyed (after Brown's death, many of his plant collections were found in a shed behind his house in a decomposed condition).

Given these limitations, we attempt to 1) reconstruct what Brown found and 2) compare it with what currently grows in the Keiffer Prairies.

RESULTS

Table 1 lists the plants collected or listed by Brown. The difference between his list and current lists produced fifty years later can be compared by simply juxtaposing them (Smith, *et al.* 1989; Allen 1993; MacRoberts & MacRoberts 1996b).

Table 1. Keiffer Prairie vascular plants in 1939.

AGAVACEAE - *Manfreda virginica* (L.) Salisb. *ex* Rose

ANACARDIACEAE - *Rhus copallina* L.

APIACEAE - *Eryngium yuccifolium* Michx., *Polytaenia nuttallii* DC.

AQUIFOLIACEAE - *Ilex decidua* Walt.

ASCLEPIADACEAE - *Asclepias viridiflora* Raf., *A. viridis* Walt., *A. verticillata* L.

ASTERACEAE - *Ambrosia psilostachya* DC., *Aster oolentangiensis* Riddell, *Aster sericeus* Vent., *Coreopsis lanceolata* L., *Echinacea pallida* (Nutt.) Nutt., *Erigeron strigosus* Muhl. *ex* Willd., *Eupatorium semiserratum* DC., *Gaillardia aestivalis* (Walt.) H. Rock., *Helenium autumnale* L., *Helianthus angustifolius* L., *Helianthus hirsutus* Raf., *Iva annua* L., *Liatris pycnostachya* Michx., *L. squarrulosa* Michx., *Rudbeckia hirta* L., *Silphium laciniatum* L., *Solidago rigida* L., *Vernonia missurica* Raf.

BORAGINACEAE - *Onosmodium bejariense* A. DC. var. *hispidissimum* (Mack.) B.L. Turner

CORNACEAE - *Cornus drummondii* C.M. Mey., *C. florida* L.

CUPRESSACEAE - *Juniperus virginiana* L.

CUSCUTACEAE - *Cuscuta cuspidata* Engelm.

EBENACEAE - *Diospyros virginiana* L.

FABACEAE - *Astragalus crassicarpus* Nutt., *Baptisia alba* (L.) Vent., *Dalea candida* Willd., *Dalea purpurea* Vent., *Desmanthus illinoensis* (Michx.) MacM. *ex* B.L. Robins. & Fern., *Gleditsia triacanthos* L., *Mimosa strigillosa* Torrey & A. Gray, *Neptunia lutea* (Leavenworth) Benth.

GENTIANACEAE - *Sabatia angularis* (L.) Pursh, *S. campestris* Nutt.

HAMAMELIDACEAE - *Liquidambar styraciflua* L.

LAMIACEAE - *Monarda fistulosa* L., *Prunella vulgaris* L., *Pycnanthemum tenuifolium* Schrad., *Salvia azurea* Michx. *ex* Lam., *Salvia lyrata* L., *Scutellaria parvula* Michx.

LILIACEAE - *Allium canadense* L., *Hypoxis hirsuta* (L.) Coville, *Nothoscordum bivalve* (L.) Britt.

LINACEAE - *Linum sulcatum* Riddell

MALVACEAE - *Callirhoe papaver* (Cav.) A. Gray

ONAGRACEAE - *Gaura longiflora* Spach., *Oenothera speciosa* Nutt.

PINACEAE - *Pinus echinata* P. Mill., *P. taeda* L.

POACEAE - *Andropogon gerardii* Vitman, *Andropogon glomeratus* (Walt.) B.S.P., *Aristida oligantha* Michx., *Aristida purpurascens* Poir., *Eragrostis spectabilis* (Pursh) Steud., *Panicum flexile* (Gatt.) Scribn., *Paspalum floridanum* Michx., *Paspalum setaceum* Michx., *Schizachyrium scoparium* (Michx.) Nash, *Setaria geniculata* Beauv., *Sorghastrum nutans* (L.) Nash, *Sorghastrum junceus* (Beauv.) Kunth.

POLEMONIACEAE - *Phlox pilosa* L.

RANUNCULACEAE - *Delphinium carolinianum* Walt., *Ranunculus fascicularis* Muhl. *ex* Bigelow

RHAMNACEAE - *Berchemia scandens* (Hill) K. Koch, *Ceanothus americanus* L.

ROSACEAE - *Crataegus* spp.

RUBIACEAE - *Diodia teres* Walt., *Houstonia purpurea* L. var. *calycosa* A. Gray

SAPOTACEAE - *Bumelia lanuginosa* (Michx.) Pers.

SCROPHULARIACEAE - *Agalinis oligophylla* Pennell, *Buchnera americana* L., *Pedicularis canadensis* L., *Penstemon australis* Small

ULMACEAE - *Ulmus alata* Michx.

VERBENACEAE - *Glandularia canadensis* (L.) Nutt., *Verbena xutha* Lehm.

VITACEAE - *Ampelopsis arborea* (L.) Koehne

MacRoberts & MacRoberts (1996b) list 137 species for two Keiffer Prairies. Brown recorded 86 species, 80 (93%) of which are on the MacRoberts' list.

Brown lists or has vouchers for six species not listed by the MacRoberts: *Asclepias verticillata, Astragalus crassicarpus, Oenothera speciosa, Panicum flexile, Ranunculus fascicularis*, and *Verbena xutha*. Four of these are reported by Smith, *et al.* (1989) or Allen (1993). The two remaining species, *Ranunculus fascicularis* and *Verbena xutha*, are widely scattered in Louisiana.

DISCUSSION

Although the sample is far from ideal (we can say nothing about relative abundance of species), clearly during the past 60 years the species list of the Keiffer Prairies has not declined. Brown's list contains no species missing today. This is an interesting finding since it appears to be generally accepted that a process of degeneration has been occurring over a wide range of "island type" communities (Hoehne 1981). Certainly, prairie degeneration occurred for most Louisiana prairies, which have ceased to exist altogether and where species once occurring in Louisiana, for example *Eustoma grandiflorum* (Raf.) Shinners, have not been found for almost 200 years (MacRoberts, *et al.* 1997). Habitat destruction caused this loss. Aerial photographs of the Keiffer Prairies show that they have shrunk considerably due to woody invasion. Many were grazed (and overgrazed) in Brown's time and after, and some have been cultivated (Smith, *et al.* 1989).

However, there is the question of the additional 40 to 50 species not reported by Brown (compare the list in Table 1 with that of MacRoberts & MacRoberts 1996b). Has the floristic diversity increased over the past fifty years or was Brown's sampling incomplete?

Brown made only irregular visits to the prairies: once each in April and June, and three times in September. He was not a driven collector or note-taker, and no evidence exists showing he attempted a total floristic list of the prairies. Quite the contrary: he often collected only a few species and otherwise merely listed plants he encountered. He paid particular attention to trees and shrubs (this was one of his specialties) and often listed woody vegetation adjacent to the prairies; he typically identified many herbaceous species only to genus. Many of the notebook entries remain incomplete and give only a blank number or genus name. Occasionally Brown gives short descriptions such as "small white flowers" but, because he did not rework his notebooks after determining species, the notebooks alone do not provide a reliable guide to the identification or location of herbarium specimens. He apparently avoided the Cyperaceae, although he found a few of the rare grasses.

While it is an intriguing possibility that species diversity in the prairies has increased since Brown's time, this is unfortunately not testable with the data we have available.

High-quality prairies are identifiable by their diversity and richness in conservative (fidel or near fidel) species, the absence of exotic species, and lack of overgrowth of

brush and trees (Packard & Ross 1997). While no one has developed a rating system for prairie species for the southern United States, such do exist for the midwestern tallgrass prairies (Masters 1997; Packard & Ross 1997; Ladd 1997). Taking into account such distributional differences as would be expected between central Louisiana and Missouri or Illinois, it is possible to estimate the overall prairie quality for the Keiffer Prairies by comparing their species with those found elsewhere, remembering, of course, that this type of comparison is highly subjective and open to different interpretations.

In 1996 we surveyed two Keiffer prairies (MacRoberts & MacRoberts 1996b). They measured 1.2 and 1.6 ha and contained 100 and 124 species, respectively. These are relatively high numbers considering the size of the prairies. Very few species were exotic. Many, such as *Carex microdonta* Torrey & Hook., *Heliotropium tenellum* (Nutt.) Torrey, *Spiranthes magnicamporum* Sheviak, and *Houstonia purpurea* var. *calycosa*, are fidel or nearly so to prairies. Keiffer Prairie grasses such as *Schizachyrium scoparium*, *Koeleria macrantha* Ledeb., *Andropogon gerardii*, *Sorghastrum nutans*, and *Panicum virgatum* L. are also characteristic of midwestern prairies.

A comparison of our plant list with Ladd's (1997) for midwestern tallgrass prairies shows a 63% similarity in species. This is impressive but an underestimate of the true similarity since many species found in the Keiffer Prairies, such as *Sporobolus junceus* (Beauv.) Kunth., *Mimosa strigillosa* Torrey & A. Gray, and *Neptunia lutea* (Leavenworth) Benth., are closely related southern congeners of more northern species. Further, when only the highest ranking conservative species are compared, it is clear that the Keiffer Prairies have basically the same species as the midwestern tallgrass prairies.

These results are encouraging and give us confidence that the Keiffer Prairie remnants are not only maintaining themselves but are high quality. That the Keiffer Prairies may be more diverse (in better condition floristically) today than they were in the late 1930's is not demonstrable from these studies, but the data do not exclude this possibility, which is an intriguing one. In 2050 some enterprising botanist can test this proposition since today we do have accurate floristic lists, notably of rare species, for all of them (MacRoberts & MacRoberts 1996a).

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